



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002TX51B

Title: Higher-Order Statistics in Transport and Evolution of Algae Blooms

Project Type: Research

Focus Categories: Water Quality, Nutrients, Ecology

Keywords: algae, transport, statistics, hydrodynamic modeling

Start Date: 03/01/2002

End Date: 02/01/2003

Federal Funds Requested: \$5,000

Non-Federal Matching Funds Requested: \$22,500

Congressional District: 10th

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Abstract

Water quality models are critical in order to develop data for US Environmental Protection Agency-mandated Total Maximum Daily Loads [TMDLs]. Currently-used water quality models use only mean values of steady-state variables [for example, dissolved phosphorus, particulate nitrogen, phytoplankton mass, and stored nutrients] to predict the occurrence of algal blooms. The use of mean values removes important maximum and minimum values as well as the population variance. As a result, these techniques have been criticized as not accurately or adequately modeling the relationships between nutrients, phytoplankton, and algal blooms. As an alternative, this project will develop a sub-grid representation of the statistical distributions for water quality variables, thus resulting in a better resolution of non-linear dynamics that need to be considered when evaluating this issue. Objectives of this project are to develop a consistent methodology to apply high order statistics [multiple modes, variance, and skewness] to represent algal and nutrient concentrations, to evaluate various transport techniques, and to implement these improvements in a 3-dimensional model.

The anticipated results of this project will be the development of statistically sophisticated, 3-dimensional, models that can be of great assistance in predicting and evaluating conditions where nutrients and poor water quality are thought to lead to algal blooms and other water quality concerns.